REMARKS

Applicants hereby respond to the Official Action dated August 25, 2003. Entry of the foregoing amendments, and reconsideration of claims 1-12, are respectfully solicited.

Paragraphs 32 and 35 of the specification have been amended to change reference numeral "30" to --25--. This amendment appears to be necessary because the drawing Figures do not show a stream 30, but do include a stream 25 which corresponds to the description in the specification that described a stream 30. Thus, these amendments merely correct a typographical error and bring the specification into conformity with the drawings.

Claims 1-12 were rejected under 35 U.S.C. 103(a) as obvious from U.S. Patent No. 6,103,143 ("Sircar '143") or U.S. Patent No. 4,126,668 ("Erickson '668") each in view of U.S. Patent No. 4,702,903 ("Keefer '903"). Applicant respectfully traverses this rejection.

There are numerous elements of applicants' invention as claimed that are not disclosed or suggested at all in the cited references. Thus, the claims cannot be obvious because the prior art completely lacks disclosure or suggestion of numerous necessary elements.

For ease of reference, claim 1 is presented here. Claims 2-12 depend directly or indirectly from claim 1:

1. A method for producing hydrogen comprising:

(A) reacting steam with a hydrocarbon feed stream in a heated regenerative reactor bed to produce hot synthesis gas and a cooled regenerative reactor bed, and cooling the hot synthesis gas in a gas cooler to produce cooled synthesis gas;

(B) passing the cooled synthesis gas through an adsorber containing adsorbent, adsorbing synthesis gas species other than hydrogen onto the adsorbent, and recovering hydrogen from the adsorber;

(C) desorbing adsorbed gas species from the adsorbent, and combusting the desorbed gas species with oxidant to produce hot combustion gas; and

(D) passing the hot combustion gas through the said cooled regenerative reactor bed to produce cooled combustion gas and said heated regenerative reactor bed.

Step (A) requires carrying out the reaction of steam and hydrocarbon feed "in a heated regenerative reactor bed". However, none of the cited references discloses or suggests carrying out that step in a heated regenerative reactor bed. Those of ordinary skill in this art know that a "regenerative bed" is a structure for storing and transferring heat, wherein its internal structural elements are alternatingly (1) heated by passing a hot fluid therethrough, so that the structural elements absorb heat from the hot fluid, and then (2) cooled by passing a fluid therethrough that is cooler than the

heated structural elements so that heat is transferred from those elements to the fluid, followed by (1) again and so forth. No such apparatus is disclosed or suggested in the cited references for carrying the reaction of claim 1, step (A).

The references also fail to teach or suggest steps (B) and (C). Step (B) requires adsorbing synthesis gas species "other than hydrogen". Step (C) contains two parts: desorbing those adsorbed gas species from an adsorbent on which the species had been adsorbed, and then "combusting the desorbed gas species with oxidant to produce hot combustion gas". The cited references contain no disclosure or suggestion of any such combustion step.

The only reference that mentions adsorption at this point is Sircar '143, but this reference teaches away from the applicants' adsorption step and discloses only conditions under which it is impossible to carry out the combustion step that applicants' step (C) requires. The Examiner's attention is respectfully directed to Sircar '143 at column 7, from line 43, where Sircar '143 refers to the "effluent gas from the first reaction zone", and requires that this gas is contacted in the second reaction zone with an "adsorbent capable of selectively separating carbon dioxide by adsorption from steam, hydrocarbon, and hydrogen". See also column 7, from line 57: "The CO_2 that is formed by reaction of steam and hydrocarbon in the first and second reaction zone is

selectively adsorbed by the adsorbent in the second reaction zone." This reference goes on to teach that the hydrogen is recovered in a mixture with other hydrocarbons, and the carbon dioxide is desorbed separately from the adsorbent (see for instance column 10, lines 15-21).

This teaching cannot possibly lead one to applicants' claimed steps (B) and (C). As for step (B), Sircar '143 clearly teaches that there are gas species other than hydrogen that are not adsorbed (such as hydrocarbon, see column 7, line 47). Sircar's teaching of adsorbing only carbon dioxide does not suggest adsorbing other components too, such as hydrocarbons. Indeed, this teaching of Sircar '143 teaches away from applicants' step (B) in which other species besides carbon dioxide must also be adsorbed because they are "other than hydrogen".

And as for step (C), wherein applicants require combusting the gas species that are desorbed, Sircar '143 does not teach or suggest any combusting at this point at all. Indeed, Sircar '143 cannot possibly carry out any combusting at this point: according to Sircar '143 the only gas species that is adsorbed is carbon dioxide, which means that the only gas species that can then be desorbed is carbon dioxide, but as one of ordinary skill in this art knows, "combusting" carbon dioxide is not possible. This amounts to Sircar '143 teaching away from

applicants' step (C), and since the other references do not teach step (C) at all the conclusion follows that all three references fail to render applicants' claims obvious.

The references also fail to disclose or suggest applicants' step (D), which requires that hot combustion gases (from the aforementioned combustion of the desorbed gas species) are passed through the cooled regenerator reactor bed that was used, and cooled, in step (A). Since none of the references teaches or suggests the combusting step as defined in step (C), they cannot possibly teach passing the resulting hot combustion gases anywhere. And since the references fail to teach or suggest the regenerator reactor bed, they cannot possibly teach passing any gas stream through that bed.

The foregoing remarks apply not only to claim 1, but also to claims 2-12 since, being dependent from claim 1, claims 2-12 necessarily include all those steps as well.

In sum, the cited references fail to disclose or suggest numerous features of the applicants' invention as claimed. As a matter of law, teachings which fail to disclose or suggest so many features of the claimed invention cannot render the claims obvious. For all the foregoing reasons, applicants respectfully submit that the rejection under 35 U.S.C. 103(a) can and should be

withdrawn, and that the application is in condition for allowance.

Respectfully submitted,

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Dated: January 26, 2004